

CHAPTER X.

LOSS OF CONSCIOUSNESS.

COMA.

Coma from Compression of the Brain — Embolism — Uraemia — Alcohol.
Hysteria—Epilepsy.—Concussion.

A SUSPENSION of cerebral activity and unconsciousness is the common sequence of many abnormal changes. It may result from structural lesions in the brain, or from the effects of poisonous substances carried to that organ by the blood. It may arise from a deficient supply of healthy blood to the nerve-tissue, as in syncope, or from defective aëration of the blood, as in asphyxia.

Coma which arises from cerebral lesions, or from the circulation of urea or alcohol in the blood, will be considered in this chapter.

By the term coma we mean a state of partial or complete insensibility—a suspension of the ordinary powers of sensation and volition, accompanied by stertorous breathing. As this condition is merely a representative of diverse disorders, a just appreciation of the cause of each variety is essential to effective treatment.

The causes of coma are: 1. Pressure on the brain-substance, from extravasated blood, depressed fracture of

cranial bones, and inflammatory products; 2. Anæmia of the brain, as in embolism and thrombosis; 3. Blood-poisons, as urea, alcohol, etc.; 4. Epilepsy; 5. Hysteria.

Extravasation of blood on the surface of the brain is usually the result of external violence. When it occurs in the substance of that organ, it proceeds from a diseased condition of the cerebral blood-vessels. They may be affected by simple fatty or atheromatous degeneration. According to Virchow, the latter commences as a low grade of inflammation in the lining membrane of the artery. There is a slight exudation between the inner and middle coats, and subsequent softening and breaking down of the different layers. In the *débris* of disintegrated tissue we find fat, cholesterine, calcareous salts, and albumen. If there is any increased action of the heart while this morbid change is in progress, the weakened walls of the capillaries are liable to give way, and allow the blood to escape.

The extravasation is most frequently located in the corpus striatum and optic thalamus, portions of the cerebrum possessing the greatest vascularity, and therefore more liable to the affection. When the blood is found on the surface, the meningeal arteries are generally ruptured, the middle meningeal more frequently than the rest.

The coma which arises from laceration of diseased arteries, in most instances, is sudden in its development. In very rare cases there are premonitory symptoms, appearing in the shape of slight facial paralysis, twitchings of the muscles, local points of anesthesia in the extremities, and bleeding from the nose. In some cases the delicate vessels of the retina rupture, and produce blindness. This occurred in the case of the late Dr. George T. Elliot. He suffered

from retinal apoplexy several months previous to the extravasations in the brain which ended his life.

When the attack is sudden, the patient falls to the ground insensible. The face presents a congested appearance; one pupil may be dilated and the other contracted, or both may be dilated. They will not act readily to the stimulus of light. If the clot of blood involve both sides of the pons Varolii, both pupils will be contracted. Strabismus exists in many cases. The respiration is labored and stertorous; with each expiration the cheeks are puffed out, as in the act of blowing. The peculiar noise, or stertor, accompanying the respiratory movement, is due to a partial paralysis of the soft palate and pillars of the fauces. The pulse is slow and full; the integument is warm and moist, but there is no increase of the natural temperature of the body. Paralysis of one side (*hemiplegia*) is usually present. When both sides are paralyzed, the extravasation will be found in the *pons*. In the face the paralysis is indicated by a drawing down of the angle of the mouth on one side, and a diminished movement on the other, or perhaps with inability to close the eye (*lagophthalmus*).

If the clot involve the crura cerebri so as to press on the third pair of nerves, there will be inability to open the eye (*ptosis*), divergent strabismus, and dilatation of the pupil on the side opposite to the general paralysis. Paralysis of the face is, in the majority of cases, on the same side as the hemiplegia. Paralysis of the extremities is seen in the different effects produced by counter-irritation, one limb moving more than another when pounded or pricked. An instrument called an æsthesiometer is now employed to as-

certain the different degrees of sensibility existing in various parts.

The sphincter muscles which guard the rectum are also paralyzed, and the fæces are passed involuntarily. The orifice of the bladder is guarded by elastic fibres, which retain the urine when the sphincter of that organ is paralyzed. The coma which follows external violence presents similar symptoms, whether connected with depressed bone or extravasated blood.

There are exceptional cases of cerebral extravasation which do not exhibit these dangerous characters for two or three days succeeding the injury. The patient may have been treated for a slight scalp-wound, without any suspicion of the real nature of the lesion. He may pursue his usual avocations with little trouble until he suddenly sinks into a state of coma, with the signs of compression plainly manifested.

A *post-mortem* examination in these cases shows that the effused blood is located principally at the base of the brain, and that it is connected with fracture of the base of the skull.

When coma supervenes three or four days after an injury, accompanied by an increase in the pulse and temperature, the pressure of inflammatory products, such as serum, lymph, or pus, may be suspected. The formation of pus, or the occurrence of pyæmia, is announced by severe rigors.

An injury to the head may be followed by entirely different symptoms from those previously described. The patient may have concussion of the brain without compression. There is loss of consciousness in both; but, in concussion, the patient is more easily roused, the face is pale, and the

surface of the body cold. In compression, the face is flushed and the body warm. Stertorous breathing characterizes the latter; in the former the respiration is natural or sighing. The pulse, in concussion, is small and rapid; in compression, it is slow and full. The pupils are generally contracted in concussion, while in compression they are dilated. The condition of the pupils, however, should not be relied on in diagnosis, as it is subject to much variation. In compression of the brain, there is usually paralysis, which alone is sufficient to distinguish it. In rare instances, compression and concussion are combined. In such cases, remedial efforts are mainly directed to relieve the former.

It is necessary to diagnose apoplectic from uræmic coma. With the latter there is usually a history of Bright's disease of the kidneys, œdema of the lower extremities, a pale, waxy countenance, and albumen and casts in the urine. In the former, these signs are usually absent. Apoplectic coma is attended by paralysis of one side of the body, and the pupils are irregular. In uræmia there is no paralysis, and both pupils are dilated. The temperature of the body is said to be higher in uræmia than in apoplexy, but this cannot be depended on in diagnosis. When the urinous odor of the perspiration exists, we have further evidence of uræmia.

Treatment.—Very little can be done to relieve the coma which results from the rupture of diseased arteries. If the patient is plethoric, the abstraction of a few ounces of blood from the arm may prevent further extravasation. Authorities differ as to the utility of this measure. The after-treatment consists in the prevention of inflammation and the administration of medicines, which assist in the absorp-

tion of the clot. For the latter purpose, iodide of potassium may be administered in doses of from five to ten grains three or four times each day. If the stomach is disordered, or an eruption of the skin is produced by its use, it should be discontinued. If inflammation be apprehended, mustard-poultices may be applied to the nape of the neck and to the feet, and the bowels should be thoroughly moved by an active cathartic. Croton-oil and elaterium are the most efficient.

If the extravasation proceed from a blow or fall on the head, the operation of trephining can be performed in one of two places, viz.: near the course of the middle meningeal artery on the side opposite to the paralysis, or directly underneath the point where the injury was inflicted. A crucial incision is made through the scalp, which is turned back and the bone exposed. The skull is then cut carefully through with the trephine. If the blood is found between the dura mater and the bone, it is readily removed. If the membrane swells up through the opening, and there appears to be blood underneath, an incision can be made through it to allow its escape. After the operation, the wound is covered, and simple water-dressings applied. The usual remedies, previously mentioned, to prevent inflammation, are then employed.

When the coma arises from depressed fracture of the skull, trephining is resorted to, or the depressed bone is raised by an elevator.

COMA FROM EMBOLISM AND THROMBOSIS.—Inflammation of the valves of the heart and atheromatous degeneration of the aorta are attended with the formation of fibrinous masses, which project beyond the natural dimensions of the artery and valve, and are liable to be washed away by the

current of blood. These small particles may be carried to the brain and plug up one of the cerebral arteries, cutting off the supply of blood from that portion. The artery most frequently involved is the left middle cerebral. The plug is called an embolus.

Diminished action of the heart, with loss of elasticity in the walls of the vessels, may predispose to the formation of a clot of blood (*thrombus*) in them. The supply of circulating fluid is cut off as in the former case, and anæmia of the part results. Either of these accidents, taking place in the brain, may produce *coma*. In some cases this is gradual, in others the attack is sudden. The coma differs very little from that which depends upon cerebral extravasation. In coma from plugging of arteries, the face is usually paler than in cerebral extravasation, and there is with it some disease of the mitral or aortic valves. Another important point in the diagnosis is, that consciousness is restored more rapidly in the former (often within two or three days), and that the paralysis is not so persistent.

Treatment.—In these cases we can only wait for developments. If softening of the brain be apprehended, stimulants and tonics are indicated. Some recommend the administration of ammonia to absorb the clot of fibrine. Its remedial action is, however, questionable.

URÆMIC COMA results from the same poison which induces uræmic convulsions. Frerichs developed the fact that these phenomena were caused by the accumulation of urea in the blood, and its subsequent change into carbonate of ammonia. Spiegelberg, a later investigator, has fully confirmed these views by a series of carefully-conducted experiments.

Urea is produced by the decay of nitrogenized tissue. It is eliminated by the kidneys. When these organs are diseased, its channels of escape are almost wholly closed, and it accumulates in the blood. There it is decomposed, one atom of urea taking two atoms of water from the blood, and forming by this combination carbonate of ammonia.

Uræmic coma occurs during the progress of Bright's disease of the kidneys, and may have all the symptoms of that affection connected with it. The patient's face has a pale, waxy look. There is dropsical effusion in the cellular tissue of the lower eyelids, and behind the ankles, or over the whole of both lower extremities. The urine is of low specific gravity. It contains albumen and casts. Preceding the coma there are headache, dimness of vision, and vomiting. The patient passes into a somnolent condition, which hourly increases, until a state of profound coma is reached. Sometimes the coma is preceded by a convulsion, without other premonitions. This is observed especially in the small contracted kidney.

The coma is accompanied by a certain amount of stertor. The pupils are dilated, but not irregular. The pulse is more rapid than usual, and lacks firmness. The temperature is sometimes slightly increased.

Poisoning by belladonna presents some similarity in its symptoms to uræmic coma. The pupils in both are widely dilated, and the insensibility is profound. The history of the case, and the absence or presence of signs of Bright's disease, determine the diagnosis.

Treatment.—Our principal efforts in all cases is to eliminate the poison from the system, through the medium of the skin and bowels, with diaphoretics and active cathartics.

Mix equal parts of croton-oil and ordinary sweet-oil, and apply four or five drops of the mixture to the back of the tongue. This can be done by moistening the end of a pencil or pen-handle with the oil, and wiping it on the back of that organ. It is not well to use the croton-oil undiluted, on account of its irritating properties. The dose should be repeated in three-quarters of an hour, if free evacuations from the bowels do not follow. If preferred, elaterium may be administered in quarter-grain doses every hour until a like effect is produced. In connection with the internal medication, profuse sweating should be produced by means of hot-air baths. Bottles of hot water and warm blankets, applied to the surface, answer the same purpose. The sweating may be kept up for a considerable time without injury, but the action of cathartics must be guarded, especially if the constitution be much weakened. In ordinary cases, this treatment should be persevered in until consciousness is restored. Prof. A. L. Loomis has lately employed morphia in uræmic coma. He administers it hypodermically, and with good success. Subsequently the action of the skin may be kept up by warm baths and mild diaphoretics. Tonics and nourishing diet are also necessary. To sustain the action of the kidneys, and at the same time to support the strength, the following may be given in teaspoonful doses four or five times a day:

B. Hydr. bichloridi gr. j.
Tinct. cinchonæ comp. fl. ℥ iv. M.

The internal administration of benzoic acid was at one time proposed as an antidote for the poison of urea; experiments, however, did not warrant a continuance of its

use. When uræmic coma is the result of acute inflammation of the kidneys, the treatment varies. In addition to the ordinary remedies, the application of wet or dry cups over these organs is required, and is generally followed by great results.

RUM COMA.—When large quantities of alcohol are taken into the system, a state of insensibility is induced which in certain particulars resembles the other varieties of coma. The comatose or “dead drunk” patient lies insensible, breathing heavily. The respiration has more of the character of a snore than of a true stertor. The pupils are regular and act to light. Sometimes they are dilated. In the early part of the coma the pulse is soft and increased in frequency, but afterward becomes slower. The breath usually smells strongly of alcohol. Too much reliance, however, must not be placed on this sign until the history of the case is examined into, for, in cases of sudden insensibility, by-standers are in the habit of administering stimulants. The patient usually has been drinking freely for some time, and the stupor appears gradually, preceded by a staggering gait, and other signs of drunkenness. Coma due to compression of the brain may be excluded, if there is no paralysis or irregularity of the pupils, or complete coma. From uræmic coma it is diagnosed by the absence of œdema of the eyelids and lower extremities, of albumen or casts in the urine, or urinous odor in the perspiration. Besides, uræmic coma is profound, while coma from rum is only partial. If the patient had a convulsion previous to the coma, and no signs of Bright’s disease present, the case might readily be mistaken for true epilepsy. Our main reliance under such circumstances must be the

history of the case and the surroundings of the patient. If the tongue has not been bitten, and there is a history of a spree, we may then exclude epilepsy.

Treatment.—If an emetic of mustard can be administered, and the stomach emptied, much good will result. Subsequent applications of cold water to the head and chest will be beneficial.

Hysterical Coma is one of the manifestations of the hydra-headed nervous affection hysteria, a disease peculiar to nervous women. Scientific investigation has not yet reached the morbid changes which occasion the disease. Its real nature is still in the dark. We know that it is characterized by a morbid sensitiveness, a tendency to imitate disease, and that it is to a certain extent under the control of the will, but farther we cannot go.

The patient imagines she has a disease, but the practised eye detects the counterfeit. She may simulate paralysis, and remain in bed for months. All the pains, aches, and diseases, which "flesh is heir to," may be represented and imitated without limit, and yet these unfortunates cannot be charged with fraud. The case of a young hysterical patient, who was at one time in Ward 24, Bellevue Hospital, furnished an excellent example of this class. On her admission, she was placed near a patient in the last stages of Bright's disease. In a few hours afterward, I found her suffering from nearly every prominent symptom exhibited by her dying neighbor. The condition lasted for a few days, when the ambitious young woman developed the signs of peritonitis, and managed to keep them up for two or three weeks. Subsequently, she passed to the care of another house-physician, and I lost sight of her. In an-

other ward of the same hospital was a young Irish girl who suffered from retention of urine. The catheter was regularly employed for several days before the real nature of the disease was discovered. Her will, or her disease, enabled her to remain three days without passing water. At the end of that period she relieved herself naturally, and continued to do so afterward. The same patient afterward developed paralysis of the lower extremities, which lasted several months. Temporary recovery took place during a thunder-storm. The noise alarmed her so that she forgot her paralysis and sprung out of bed. It returned again in a milder form, but gradually wore away. When discharged from the hospital, she was entirely cured.

Hysterical coma is a comparatively rare manifestation of the disease. It is often preceded by general excitability, and by spells of violent laughter and crying without assignable cause. There is often a sense of choking (*globus hystericus*), due to contractions of the cesophagus, from below upward. It gives a feeling as if a ball were rising in the throat. Previous to the coma there may have been a convulsion, but it is not always an accompaniment.

The patient, during the attack, lies motionless, and to all appearance unconscious. The breathing is natural. There is no lividity or other unnatural condition of the face. An examination of the eyes will show that the patient sees all that is passing around her, and that the pupils act to light. The pulse is natural in all respects. The absence of stertorous breathing, insensibility, and irregularity in the pupils, suffices to show that there is no compression of the brain or other serious affections.

Treatment.—For hysterical coma, the cold douche is the

best known remedy. Two or three pitchers of cold water, poured from a height upon the face, will generally suffice to bring about a recovery. The after-treatment consists in developing self-control, sustaining the general health with fresh air and good food, the removal of any existing disease of the generative apparatus, and the administration of anti-spasmodics, as musk, valerian, assafoetida, etc.

EPILEPTIC COMA follows an epileptic convulsion. The insensibility is never complete. Blood may collect on the lips. There is laceration of the tongue. The sudden occurrence of the convulsion when the patient is in good health otherwise, and the complete recovery when the attack has passed away, serve to distinguish this disease in all cases. (*See* article on Epileptic Convulsions.)

Treatment.—Epileptic coma does not require treatment. To prevent a recurrence of the convulsion, bromide of potassium can be given. Ten grains, four times a day, will be enough for an adult.

CONCUSSION OF THE BRAIN.

Concussion of the brain may be defined as a shaking together of the contents of the cranial cavity, with more or less contusion of the brain-substance, and attended by partial or complete unconsciousness. The injury may be produced by direct blows upon the head, or by jumping from a height and alighting on the heels, the force in the latter case being transmitted through the spinal column.

In some cases the most careful examination of the brain after death fails to detect signs of contusion. In the majority, however, minute points of extravasation, discoloration,

and softening of small portions of the nerve-substance, are found.

Millar, Wood, and others, divide concussion into three stages: 1. That of insensibility; 2. Reaction; and 3. Excessive reaction or inflammation. The symptoms attending the first stage vary with the amount of concussion. In typical cases, the patient falls unconscious after receiving the injury. The skin is pale and cold, and the pulse small and rapid. Respiration is natural or sighing. The pupils are contracted, or one may be contracted and the other dilated. The sphincter muscles are not often interfered with.

In the second stage, the patient vomits and shows evidences of returning consciousness. The pulse becomes stronger, warmth returns to the body, and slight color to the lips and cheeks. If this reaction be excessive, showing a tendency to inflammation, the third stage is ushered in. The skin becomes dry and hot, and there is considerable headache. The pulse rises, and is firmer than during the preceding stages. Finally, if the case progresses unfavorably, all the signs of meningitis are manifested, such as intolerance of light, intense headache, contracted pupils, sub-sultus tendinum, delirium, and finally coma. The differential diagnosis between compression of the brain and concussion has already been given.

In many instances, the concussion is extremely slight, lasting but a few moments. This is the case where the patient is merely stunned, and the effect soon passes away. In other cases, the concussion is so great as to cause instant death.

Treatment.—If there be collapse, hot bottles and blankets are to be applied to the extremities, and the circulation

stimulated by friction with the hands. Diluted enemata of brandy and ammonia are also serviceable. All stimulating efforts must cease as soon as reaction returns. Should inflammation set in, the ordinary antiphlogistic treatment, previously referred to, will be necessary.

CHAPTER XI.

LOSS OF CONSCIOUSNESS—(CONTINUED).

SYNCOPE.

Syncope from Hæmorrhage.—Thrombi in the Pulmonary Vein.—Anæmia.—Mental Emotion.—Blows on the Epigastrium.—Collapse.

THE normal performance of every function depends on an adequate supply of healthy blood. The delicate machinery ceases when the proportion to each part is not commensurate with its demands.

The continuous pulsatory movements of the heart propel the blood into the vessels which carry it to all parts of the body. A partial or complete cessation of the action produces a condition known as syncope, or fainting. This is characterized by unconsciousness, and by suspension of the powers of volition.

The regular contractions of the heart depend upon several conditions: 1. A sufficient and regular supply of blood, which exercises a stimulating effect on its fibres; 2. A normal proportion of the necessary ingredients in the circulating fluid; 3. A healthy state of the brain and of the nerves and sympathetic ganglia which supply the heart; 4. A special irritability possessed by the muscular fibres, which causes its contractions to continue even when all connection